7460.001 RLM

CROSSTIE DISPOSAL
PROBLEM OR OPPORTUNITY?

Peter Conlon
Association of American Railroads

Presentation to the
American Wood Preservers Institute
Workshop on
Treated Wood Life-Cycle Management
Chicago, Illinois
October 21, 1992

ABSTRACT

Disposal of creosote-treated wood crossties is becoming a significant problem for the railroad industry. There are over 750 million crossties in use by railroads in the United States and Canada. Between 10 and 15 million are replaced annually. About 62% are sold directly to contractors which in turn resell usable ties to railroads, landscapers, and others. Unusable ties are disposed of in landfills. Railroads dispose of about 20% directly in landfills. About 15% are burned in cogeneration plants and industrial boilers. The remaining crossties are stored or given away.

Landfill space is quickly disappearing all over the country. The market for landscape timber is limited. Economically feasible recycling technology has not been successful to date. Air pollution regulations have all but eliminated open burning of crossties. Controlled incineration can meet air emission requirements, but the costs involved in using centralized facilities can be a significant barrier to widespread use despite energy recovery potential. New approaches to tie disposal are needed that are financially acceptable to railroads and incorporate the cost of transporting ties to disposal sites. Life-cycle costing can be an effective decision-making tool for railroads in determining financial acceptability.

Introduction

There are over 750 million crossties in use by railroads in the United States and Canada and all of them will eventually have to be disposed of. At the current rate of replacement of 10-15 million crossties per year, the tie disposal problem will be with us for many years to come.

11/15

To all Environmental Protection personnel as info — Jim

Considering how long railroads have used crossties and other treated wood products, disposal problems are a relatively recent phenomena for the industry. Prior to national environmental regulations, ties were generally burned alongside the track or simply pushed off the right-of-way and left to decompose. Air pollution concerns have all but done away with open burning and leaving old ties along the right-of-way has become unacceptable in many areas.

In 1975, industry environmental officials asked the AAR to undertake a study of crosstie disposal practices. Alternative uses of crossties were examined in hopes of identifying and possibly stimulating beneficial reuse technologies. An outgrowth of that study was a more widespread recognition of the problem. The reconstituted crosstie gained some recognition as a result of that study. The issue was reviewed again in 1984. Regulatory requirements applicable to feasible disposal options were examined. That study developed projected average costs of various disposal methods and investigated the environmental constraints on each. A financial model was developed to assist railroads in selecting the most cost-effective disposal method for each application.

Disposal Trends

A comparison between tie disposal practices in 1980 and today reveal some interesting trends. About 18% of the ties removed in 1980 were burned along the right-of-way and less than 1% were burned as a fuel. Today, very few are burned in the open and about 15% are burned as a fuel in cogeneration plants and boilers. In 1980, about 10% of ties were landfilled. This has increased to an estimated 20% today, but most railroads report that landfill space is increasingly unavailable for crossties. In 1980, burial on the right-of-way accounted for almost 26% of the ties removed from track. None are disposed of in that manner owing to local and state environmental restrictions. In 1980, about 27% were sold to contractors. Today, contractors dispose of about 62% of the crossties. Of these, about 75% are sold to contractors or contractors remove the ties at no cost to the railroads.

The 1980 data were based on a very thorough survey of the industry. That year almost 26 million ties were replaced. The current percentages are based on the preliminary results of a survey being done by American Railway Engineering Association Committee on Ties and Wood Preservation, whose help is gratefully acknowledged. The 1992 figures are based on replacement of about 13 million ties and does not represent tie replacement data from all railroads.

Improvements in track maintenance technology have had a significant effect on the tie disposal problem. Tie replacement productivity was increased considerably in the 1960-70s with the development of the tie shear, which cut ties in track into three

pieces. However, this multiplied the problem of handling discarded ties. The whole tie is, depending on its condition, a reusable product that could be moved in one operation. A tie cut into three pieces requires more work to move it and the butts have little recycle potential other than as a fuel. In 1980, over 65% of the ties were cut into sections before being removed from track. Now, virtually all ties are removed whole.

Current Disposal Practices

Recycling

Railroads typically cascade some reusable ties to less demanding service requirements, such as from mainline track to secondary track or yards. This extends the life of a tie, but eventually they still must be disposed of.

Many railroads use contractors to collect ties for resale or disposal. In some cases, contractors pay railroads for the ties where there is a strong market for landscape timber. Sale of ties to landscapers and other consumers, while a common practice, is declining in some areas. Market saturation is one cause, but concerns about possible effects of exposure to creosote treated wood may also be a factor. Railroads are becoming concerned that their liability is no longer under their control. Selling ties for use as landscape timbers and fenceposts just transfers the disposal problem.

More often, railroads pay contractors to remove all of the ties from an area, regardless of condition. Contractors presumably recover their costs and make a profit on resalable ties while bearing the cost of disposing of the unusable ties. This practice is under scrutiny by many companies. While some of the ties may be reusable, either by a railroad, landscapers, or farmers, many more are not reusable. With landfill space increasingly limited or nonexistent in some areas, it is difficult for the contractors to dispose of the scrap ties. Some railroads report that scrap ties are piling up because the contractors cannot find suitable disposal facilities. They may be stored on the right-of-way, or collected on railroad property or land owned or leased by the disposal contractor.

A promising technique to extend the life of crossties was the reconstituted crosstie. Prototypes were tested in revenue service on many railroads in the 1970s and 1980s and, with encouraging test results, a facility was built to produce the product. Two scrap ties were shredded to make one new tie. No new creosote was added, but a resin material was used to bond the wood fibers. Unfortunately, manufacturing problems plagued the production process and the company recently went out of business. At this time and for the foreseeable future, recycled wood crossties are unavailable. It remained to be seen how often a recycled tie can

be recycled and if final disposal is affected by the resin.

Land Disposal

It is becoming more difficult to dispose of ties in public and private landfills. Ties use up a lot of space, especially if they are not bundled. Landfill space is at a premium in many areas. Many railroads are already experiencing problems finding landfills that are willing to take crossties.

Disposing of ties in public or private landfills is often seen as a permanent disposal option. It may not be. Some regulatory agencies have expressed concern about the possibility that creosote residue will leach out of old crossties and contaminate landfills. Toxicity Characteristic Leachate Potential (TCLP) tests conducted by the AAR and several railroads on new and old ties show that the leachate levels are orders of magnitude below EPA limits. Despite these findings, some railroads have been required by state or local environmental agencies to excavate areas where ties were buried.

Possible future changes in environmental regulation of land disposal of treated wood is also a concern. While creosote-treated wood is presently not considered a hazardous waste under federal regulations, the rules may change. The fact that some states already require special handling of treated wood waste increases the likelihood that other regulatory agencies may increase control over used crossties. Potential future costs associated with land disposal of treated wood could be significant.

Chipping ties and disposing of the chips along the right-of-way has been practiced by some railroads, but this has created some environmental problems. Tie chips add to the fire hazard. Drainage problems can also occur from this disposal method. Mobile tie chippers are costly to maintain since old ties often contain spikes, tie plates, anti-splitting devices, steel dowels, and pieces of stone ballast. Tie chipping logically increases the rate at which biodegradation takes place, though it is not known how much faster tie chips degrade as opposed to whole ties.

Leaving old ties along the right-of-way has been banned by some regulatory agencies. Railroads have limited or stopped this practice because of employee safety concerns, drainage problems, fire hazards, aesthetics, and interference with track and right-of-way maintenance operations.

Incineration

Incineration is the only method commonly in use today that offers permanent disposal. Once a tie is burned, all that remains is ash. Ash from crossties can be disposed of in landfills with or without treatment, depending on its pH.

Open burning, once a widespread practice, has been banned in nearly all areas of the United States and Canada. Numerous alternative approaches to tie incineration have been attempted with some success. Low technology equipment such as air curtain destructors have been used to burn ties but, due to varying local regulatory requirements, are not in widespread use. Air curtain destructors are not designed to recover energy.

More sophisticated incineration technology has been used for large scale tie destruction. Large power plants, pulp mills, and other facilities have tested crossties for use as a primary fuel or as a supplement to their usual fuel. This method does have the advantage of energy recovery. Crossties contain an estimated 6,300 to 8,600 btu per pound, depending on moisture content and other factors. While there appears to be markets for the wood fuel in many areas, few sustained operations involving crossties have actually been developed.

Perhaps the most notable example of a successful incineration program is the partnership of Conrail and Koppers involving a cogeneration facility in Muncie, PA. This facility is designed to burn about 900,000 ties per year, representing the bulk of Conrail's annual tie disposal requirements. Koppers and Kerr-McGee are presently promoting this approach to other railroads.

Fuel blending, mixing tie chips with coal, is currently practiced in the upper midwest area. Several railroads send ties to a company that chips the ties for resale as a primary fuel or for blending with other wood waste or coal. The fuel is used in electric power plant boilers.

Most incineration approaches require that ties be chipped or shredded. Many attempts have been made using relatively small portable chippers or shredders. These are not effective, as previously discussed. Use of large shredders or chippers designed for metal can minimize this problem, although the equipment is costly. Removal of any foreign material can be done mechanically or magnetically after the wood has been broken up. Chipping or shredding a crosstie increases the volume of wood waste up to three times. To keep moisture levels at a minimum, stockpiles of chipped or shredded wood waste must be covered.

Handling and transportation costs are important factors. Many entrepreneurs seem eager to develop the use of crossties as a fuel. They see the huge supply of wood but often fail to consider the transportation and handling costs of bringing the ties to an incineration facility. Scrap crossties may be spread out over hundreds or thousands of miles of track. The cost of picking up ties removed from track and transporting them to a disposal point is affected by numerous variables including type of equipment used to pick up ties, condition of ties, rail equipment available, crew

size, and unloading requirements. The greater the distance ties must be hauled, the greater the transportation cost. These costs vary considerably and can be a determining factor in the selection of disposal alternatives.

Proposals for incineration or cogeneration projects usually specify an annual minimum number of ties to assure an adequate fuel supply. However, tie renewal programs do not necessarily generate the required volume. Pooling resources with other railroads has been suggested as a solution to that problem. But, transportation costs will be higher on another railroad than on ones own line. If a new facility could be sited at a junction of two or more railroads, that problem could be avoided. Establishing pooling agreements for existing facilities served by only one railroad would be more costly.

Solutions

Most railroads recognize that long-term solutions to the problem of crosstie disposal are needed. Some railroads are simply storing ties until solutions become available. Others are actively seeking to develop solutions that suit their needs. The goal of several railroad studies now underway is to define the available options, evaluate the costs, and select the option or mix of options that will result in the least cost. Some are trying to make tie disposal not only break even but return a profit.

Barriers to the implementation of effective solutions to the crosstie disposal problem are primarily economic and institutional. Life-cycle costing of crossties has not been commonly practiced by the railroad industry. Crosstie costs are measured by purchase price, installation cost, and maintenance costs. Until the past few years, disposal costs have not been included because disposal has not been a significant problem. Institutionally, it is difficult to establish cooperative tie disposal agreements between railroads. It is expected that each railroad company will go about solving its disposal problems in the manner best suited to the locations and situations until more effective solutions emerge.

New approaches to managing the problem are being discussed among railroads. One idea envisions a program where an organization would broker crossties on behalf of the cooperating railroads. Participating railroads would agree on the cost of handling each other's cars of scrap ties. Disposal options would be pursued on a regional basis and the most economically attractive options selected. The railroad's representative could have the authority to make contracts and have oversight responsibilities to ensure that the crossties were disposed of in acceptable ways.

Another approach would call for crosstie suppliers to accept an old tie for every new tie they deliver to a railroad. This "tie for a tie" approach is similar to automotive battery recycling.

Suppliers could develop the most economical disposal facilities appropriately sized to handle used ties returned from all of their customers. The value of energy recovery would be factored in to offset capital and operating costs. The cost of a new tie would be reevaluated to ensure that suppliers are compensated for their net disposal costs. Thus, the disposal cost is paid at the time a tie is purchased. An important benefit to railroads would be improved utilization of freight cars. Old crossties could be returned to the tie supplier in the same cars that new ties are shipped in. This would reduce empty car miles.

New technologies are being developed that, while in the demonstration stage, appear to be effective at preparing crossties for permanent disposal. Recovery of creosote residuals using solvents to create clean wood suitable for reuse has been tested at the Louisiana State University. At the current state of development, this is a costly operation. Gasification technology producing a diesel-like liquid fuel has been successfully tested on a small scale on crosstie chips.

For railroads to make informed choices among the tie disposal options available now and in the future, knowledge of the complete costs of crosstie disposal options is essential. Life-cycle costing will provide that information. Life-cycle cost is defined in a recent article by Cohan, et al as "all costs associated with acquiring, handling, storing, using, and managing the use of a product, plus all costs of managing, treating, and disposing of any wastes or residuals associated with the product or its use." Armed with such information, the railroads will be able to make decisions about tie disposal with greater accuracy and judgement.

References

Life-Cycle Cost

A thorough explanation of life-cycle costing is available in an article entitled "Beyond Waste Minimization: Life-Cycle Cost Management for Chemicals and Materials" by David Cohan, et al in the Summer 1992 issue of Pollution Prevention Review. One of the examples cited in the article is creosote-treated utility poles which have many parallels to railroad crossties.

Crosstie Disposal

The most recent AAR report on crosstie disposal is "The Disposal of Discarded Railroad Crossties, A Method of Analyzing Alternatives", report number R-579, April 1984. Copies of the report are available from the AAR Technical Center, 3140 South Federal Street, Chicago, IL 60616. The cost is $30 for non-AAR members.

TREATED WOOD
LIFE CYCLE MANAGEMENT PLAN

by

AMERICAN WOOD PRESERVERS INSTITUTE

JEFFREY H. BULL, MANAGER ENVIRONMENTAL, QUALITY, TECHNICAL SERVICES
KERR-MCGEE CHEMICAL CORPORATION, FOREST PRODUCTS DIVISION

JAMES FORSHAW, VICE-PRESIDENT
WOOD PROTECTION PRODUCTS INCORPORATED

Treating wood with a wood preservative pesticide approved by the U. S. Environmental Protection Agency extends the useful life of the wood. It protects the wood from attack by wood destroying organisms including fungus and insects. By extending its life from 3 - 5 years to 25 - 50 plus years, wood preserving pesticides conserve our forests; an economical and renewable natural resource used to build housing, transport commerce by rail, provide communication and energy links and other wood products vital to everyday life.

The primary use of treated wood products include lumber, utility poles, railroad ties, construction and marine piling, bridge timbers and farm posts. At the same time treated wood has numerous secondary uses after its primary life. The continued use of treated wood extends its life well beyond the 25 -50 year mark. Depending upon the secondary use(s) employed, the need for disposal of treated wood can be minimized. In this environmentally sensitive time, the minimization of wastes has to be a primary goal of all responsible corporations.

The purpose of this paper is to promote the complete life cycle management of treated wood. This includes both the primary life and secondary use(s) of treated wood. The ultimate goal of life cycle management is encourage the proper use and final disposition of treated wood. This should result in minimizing the need to dispose of treated wood. This can be achieved through the proper management of treated wood and the utilization of several secondary uses. By doing this the treated wood industry, including the users of treated wood, can continue the wise management of a precious renewable resource; our forests.

LIFE CYCLE MANAGEMENT

What is life cycle management? Life cycle management is the management of a material throughout its useful life. The useful life of a product continues until the product no longer provides a beneficial use to any user thus requiring the material/product to be disposed of as a waste. As presented in the introduction to this paper, the useful life of treated wood can extend thru several "generations" of users. It can include several uses as long as it continues to provide a benefit.

Historically, treated wood has been beneficially used by the primary/initial user of the product and subsequently it provided a benefit to others in a secondary use role. The primary and secondary beneficial uses established over the last 10-20 plus years are presented below.

PRIMARY BENEFICIAL USES

- Utility Poles
- Railroad Ties and Switch Ties
- Construction and Marine Piling
- Marine Lumber
- Commercial/Domestic Lumber
- Industrial/Construction Lumber
- Mine Timbers
- Bridge Timbers
- Posts
- Highway Guard Rail
- Highway Noise Barrier

SECONDARY BENEFICIAL USES

- Landscape Timbers
- Parking Chocks
- Secondary Use Fence Posts
- Reconstituted Wood
- Secondary Use Railroad Ties
- Secondary Use Utility Poles
- Industrial and Utility Boiler Fuel
- Cement Kiln Fuel
- Brick Kiln Fuel
- Fuel Supplement in Refuse Incinerators

As with most products, there may come a time in the life of the product when it can no longer serve a useful primary or secondary role. It is at that time that the product must be disposed of as a waste. Historically, treated wood has been disposed using the most economical method available. The methods utilized over the last 50 years include the following.

HISTORICAL DISPOSAL METHODS

- Open Burning
- Abandonment at Removal Site
- Bury at Removal Location
- Industrial Landfill
- Municipal Landfill

Legislative and regulatory actions at both the federal and state level have restricted the disposal options in most instances to industrial or municipal landfills. Recent amendments to the Solid Waste Disposal section of the Resource Conservation and Recovery Act (Subtitle D), require the reduction of the amount of wastes disposed of in a landfill. The primary objective of the new amendments is to minimize the generation of wastes disposed of in landfills through the proper and extended use of all resources and products; including treated wood.

The Federal government does not define treated wood as a hazardous waste requiring special handling and disposal unless the wood fails the Toxicity Characteristics Leaching Procedure, (TCLP) (See Attachment A). Numerous tests have been conducted which indicate that treated wood does not fail the TCLP (See Attachment B). However several states are currently reviewing the disposal of treated wood to determine if more stringent regulations are necessary. This could result in a state(s) classifying treated wood as a waste requiring special handling and disposal. The primary concern is for any and all bulky wastes which take up valuable space in landfills.

LIFE CYCLE MANAGEMENT PLAN

Given that the definition of life cycle management incorporates the management of treated wood throughout its primary and secondary use(s) and until it requires disposal, what constitutes the Life Cycle Management Plan for treated wood? Any responsible management plan must balance three important factors; cost, effectiveness and risk. The bottom line is to develop the most cost effective management plan that effectively reduces the risk to an acceptable level for management.

This paper will not discuss costs because costs can vary throughout the U.S. and vary from situation to situation. And the effective reduction of risk depends upon what level of risk one wishes to accept. But what then are the risks? The basic risks are identified as follows.

1) In the event that industry does not have an effective plan, the environmental regulatory community will develop a regulatory plan resulting typically in over regulation at a higher than acceptable cost. If industry does not do an adequate job of self regulation it will become regulated by others.

2) The plan must limit industry's immediate and future exposure/liability regarding current state and federal regulations. The plan can not include items which result in an unacceptable exposure to regulatory, product liability or public action against industry.

3) The plan must address the public's concern and industry's responsibility for the environment.

Given the risks presented above, a treated wood life cycle management plan must be based upon the utilization of both primary and secondary uses to the maximum extent possible. By doing this one will minimize the generation of a waste requiring disposal in the only available option, landfills. The utilization of treated wood as fuel will result in minimal disposal. Only the ash, or approximately 5% of the wood volume, would require disposal. At the same time, the potential exists for utilizing certain wood ash in the manufacturing of cement of as a soil additive. Landfilling of wood ash is acceptable providing the ash passes the TCLP. Tests show that treated wood ash will pass the TCLP provided the material is burned properly. Utilizing treated wood as fuel in a managed situation can minimize immediate and future liability by destroying the material and rendering it into a relatively harmless and environmentally friendly condition.

Several other secondary options also reduce risk by ensuring that the material is maintained in service in a controlled and managed state. These include the use of treated wood as landscape material, and lower grade material of the same product. However, the material will still require disposal in a landfill upon completion of its useful life unless the final beneficial use is as a fuel or other means that do not generate wastes.

SUMMARY

The treated wood industry and the end users of treated wood must undertake a program to properly manage treated wood throughout its life cycle. Failure to do so will result in the federal and/or state regulatory agencies developing a regulatory plan for treated wood which will include additional regulatory burden and costs. In addition, the regulation of landfills will limit the use of landfill as a disposal option for all bulky wastes regardless of a lack of threat to the environment. This will require several industries including the treated wood industry to minimize the generation of wastes requiring disposal via landfill.

The life cycle management plan for treated wood must include both primary and secondary uses that result in minimizing the generation of wastes requiring disposal. The plan must also cost effectively minimize the risk of corporate exposure while maintaining a corporation's environmental responsibility. The ultimate plan, therefore, will include the proper management of treated wood during its primary use followed by one or more secondary uses. The final secondary use should be as a fuel or other means which minimizes the generation of waste requiring landfill disposal.

RLM

ENVIRONMENTAL SOLUTIONS, INC.

December 2, 1992

Mike - This is like the AAR study, only based on California test methods. This, too, shows ties to not be haz waste. DWE

Project No. 92-797

Mr. David C. Clark, P.E.
Director, Environmental Quality
and Hazardous Materials
Santa Fe Railway Company
One Santa Fe Plaza
920 SE Quincy
Topeka, KS 66612

Transmittal
Results of Selected Waste Characterization Testing of Crossties
from Middle River Bridge
Stockton, California

Dear Mr. Clark:

As requested, we have performed selected waste characterization testing on a composite sample of crossties from the Middle River Bridge in the Sacramento Delta west of Stockton, California. Samples were collected on October 29, 1992 from two different crossties by removing slices from the center of the crossties. The samples were then subdivided and composited for analysis. The sample was analyzed for the following:

- TPH as gasoline and BTEX by Modified EPA Method 8015/8020,
- TPH as diesel by Modified EPA Method 8015,
- TCLP for cresols and PCP by EPA Method 8270,
- CAM-17 metals (Total and STLC), and
- 96-hour Aquatic Toxicity.

The results are summarized in the attached Table 1, and copies of the laboratory results are provided as Attachment A. Based on the above analyses, the crossties do not exhibit properties of a hazardous waste. Per your request, we are also including a copy of the laboratory results for the wood debris from the Middle River Bridge as Attachment B.

If you have any questions or comments, please do not hesitate to call.

Sincerely,

Jeffrey Hess

Jeffrey Hess
Project Manager

Attachments

cc: Tim Lassen
Mick Hardin

2815 Mitchell Drive - Suite 103 - Walnut Creek, CA 94598 (510) 935-3294 - FAX (510) 935-5412

TABLE 1

RESULTS OF SELECTED WASTE CHARACTERIZATION TESTING FOR CROSSTIES FROM MIDDLE RIVER BRIDGE

COMPOUND	CONCENTRATION			REGULATORY LIMIT
	Total (mg/kg)	TCLP (mg/L)	STLC (mg/L)	
PETROLEUM HYDROCARBONS				
TPH as gasoline	7	–	–	–
Benzene	0.031	–	–	–
Toluene	0.102	–	–	–
Ethylbenzene	0.43	–	–	–
Xylenes	1.6	–	–	–
TPH as diesel	4,600	–	–	–
TPH as motor oil	4,000	–	–	–
PHENOLS				
o-cresol (2-methylphenol)	–	0.086	–	200 (TCLP)
m-cresol (3-methylphenol)	–	<0.005	–	200 (TCLP)
p-cresol (4-methylphenol)	–	0.21	–	200 (TCLP)
Pentachlorophenol	–	<0.025	–	100 (TCLP)
SELECTED METALS				
Arsenic	<0.25	–	<0.05	500/5 (TTLC/STLC)
Chromium	<0.5	–	<0.1	2,500/5 (TTLC/STLC)
Copper	1.3	–	<0.05	2,500/25 (TTLC/STLC)
Lead	2.3	–	<0.10	1,000/5 (TTLC/STLC)
96-HOUR AQUATIC TOXICITY				
96-hour LC50	>750 mg/L			

TABLE 2

RESULTS OF SELECTED WASTE CHARACTERIZATION TESTING FOR WOOD DEBRIS FROM MIDDLE RIVER BRIDGE

COMPOUND	CONCENTRATION			REGULATORY LIMIT
	Total (mg/kg)	TCLP (mg/L)	STLC (mg/L)	
PETROLEUM HYDROCARBONS				
TPH as gasoline	280	-	-	-
Benzene	0.33	-	-	-
Toluene	2.1	-	-	-
Ethylbenzene	2.0	-	-	-
Xylenes	8.6	-	-	-
TPH as diesel	6,700	-	-	-
TPH as motor oil	-	-	-	-
PHENOLS				
o-cresol (2-methylphenol)	-	2.8	-	200 (TCLP)
m-cresol (3-methylphenol)	-	<0.005	-	200 (TCLP)
p-cresol (4-methylphenol)	-	5.6	-	200 (TCLP)
Pentachlorophenol	-	0.025	-	100 (TCLP)
SELECTED METALS				
Arsenic	.85	-	<.05	500/5 (TTLC/STLC)
Chromium	<0.5	-	<0.1	2,500/5 (TTLC/STLC)
Copper	1.2	-	<0.05	2,500/25 (TTLC/STLC)
Lead	<0.50	-	<0.10	1,000/5 (TTLC/STLC)
96-HOUR AQUATIC TOXICITY				
96-hour LC50	>750mg/L			

ATTACHMENT A

COPIES OF LABORATORY RESULTS FOR CROSSTIES
FROM MIDDLE RIVER BRIDGE

CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

November 5, 1992 ChromaLab File No.: 1092288

ENVIRONMENTAL SOLUTIONS, INC.

Attn: Jeff Hess

RE: One wood sample for Gasoline/BTEX and Diesel analyses

Project Name:
Project Number: 92-797
Date Sampled: Oct. 29, 1992 Date Submitted: Oct. 29, 1992
Date Extracted: Oct. 30, 1992 Date Analyzed: Oct. 30, 1992

RESULTS:

Sample I.D.	Gasoline (mg/Kg)	Diesel (mg/Kg)	Benzene (µg/Kg)	Toluene (µg/Kg)	Ethyl Benzene (µg/Kg)	Total Xylenes (µg/Kg)
CROSS TIES	7.0	4600*	31	102	430	1600
BLANK	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
SPIKE REC	95%	106%	88%	88%	87%	88%
DUP SPIKE REC	----	115%	92%	90%	91%	95%
DET LIMIT	1.0	1.0	5.0	5.0	5.0	5.0
METHOD OF ANALYSIS	5030/ 8015	3550/ 8015	8020	8020	8020	8020

*Unknown hydrocarbon found in diesel range quantified as diesel. Also, 4000 mg/Kg of motor oil was found in sample.

ChromaLab, Inc.

Billy Thach
Analytical Chemist

Eric Tam
Laboratory Director

cc

2239 Omega Road,#1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

November 05, 1992 ChromaLab File # 1092288 B

Client: Environmental Solutions, Inc.
Attn: Kristina Carlson
Date Sampled: Oct. 29, 1992 Date Submitted: Oct. 29, 1992
Date Extracted: Oct. 31, 1992 Date Analyzed: Oct. 31, 1992

Analysis Requested: TCLP-Phenols

Project Name: 92-797
Sample I.D.: CROSSTIES
Method of Analysis: TCLP 8270 Matrix: wood

COMPOUND NAME	Sample mg/L	MDL mg/L	Spike Recovery
2-METHYLPHENOL (o-CRESOL)	0.086	0.005	-----
3-METHYLPHENOL (m-CRESOL)	N.D.	0.005	98% 91%
4-METHYLPHENOL (p-CRESOL)	0.21	0.005	-----
PENTACHLOROPHENOL	N.D.	0.025	115% 103%

ChromaLab, Inc.

Yiu Tam
Analytical Chemist

Eric Tam
Lab Director

2239 Omega Road, #1 • San Ramon, California 94583
510/831-1788 • Facsimile 510/831-8798
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

November 3, 1992 ChromaLab file number: 1092288

ENVIRONMENTAL SOLUTIONS

Attn: Jeff Hess

RE: One wood sample for Total CAM 17 Metals analyses (CA Title 22)

Project Name:
Project Number: 92-797
Date Sampled: October 29, 1992 Date Received: October 29, 1992
Date Analyzed: October 30, 1992

RESULTS: Sample I.D.: CROSS TIES

Metals	Concentration (mg/Kg)	Detection Limit (mg/Kg)
Antimony (Sb)	N.D.	1.00
Arsenic (As)	N.D.	0.25
Barium (Ba)	3.8	0.25
Beryllium (Be)	N.D.	0.05
Cadmium (Cd)	N.D.	0.05
Cobalt (Co)	N.D.	0.50
Chromium (Cr)	N.D.	0.50
Copper (Cu)	1.3	0.25
Lead (Pb)	2.3	0.50
Mercury (Hg)	N.D.	0.05
Molybdenum (Mo)	N.D.	0.25
Nickel (Ni)	1.5	0.50
Selenium (Se)	10	0.50
Silver (Ag)	N.D.	0.25
Thallium (Tl)	N.D.	2.00
Vanadium (V)	0.60	0.50
Zinc (Zn)	4.4	0.25

Method of Analysis: 3050/6010/7471

ChromaLab, Inc.

Charles Woolley
Analytical Chemist

Eric Tam
Laboratory Director

cc

2239 Omega Road,#1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

November 3, 1992

ChromaLab File No.: 1092288

ENVIRONMENTAL SOLUTIONS

Attn: Jeff Hess

RE: One wood sample for Waste Extraction (STLC) CAM 17 analyses

Project Name:
Project Number: 92-797
Date Sampled: October 29, 1992
Date Submitted: October 29, 1992
Date Analyzed: November 2, 1992

RESULTS: Sample I.D.: CROSS TIES

Metals	Concentration (mg/L)	Detection Limit (mg/L)
Antimony (Sb)	N.D.	0.20
Arsenic (As)	N.D.	0.05
Barium (Ba)	N.D.	0.05
Beryllium (Be)	N.D.	0.01
Cadmium (Cd)	N.D.	0.01
Cobalt (Co)	N.D.	0.10
Chromium (Cr)	N.D.	0.10
Copper (Cu)	N.D.	0.05
Lead (Pb)	N.D.	0.10
Mercury (Hg)	N.D.	0.01
Molybdenum (Mo)	N.D.	0.05
Nickel (Ni)	N.D.	0.20
Selenium (Se)	N.D.	0.10
Silver (Ag)	N.D.	0.05
Thallium (Tl)	N.D.	0.10
Vanadium (V)	N.D.	0.10
Zinc (Zn)	N.D.	0.05

Method of Analysis: WET/3010/6010/7470

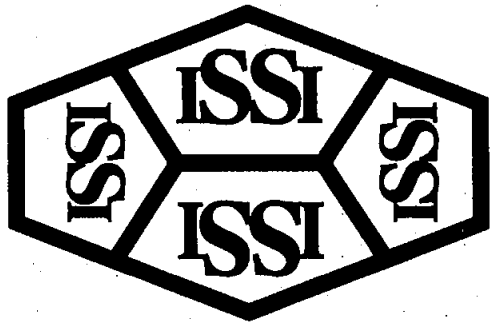
ChromaLab, Inc.

Charles Woolley
Analytical Chemist

Eric Tam
Laboratory Director

cc

2239 Omega Road,#1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157



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ISSI Operations Staff

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AT

CHAIN OF CUSTODY RECORD

Ship To: CHROMALAB
Attn:

Page 1 of 1
Project Name 92-797
Project No.
Site Location
Date 10-29-92

Sample ID	Depth	Date	Time	Sample Type: Water	Solid	Other	Comp	Grab	Sample Containers: Vol.	No.	Type	Pres.	CAM 17 metals	STLC metals	TPH-G/BTEX	TPH-D	TCLP for PCP	o,m,p-Cresol	REMARKS
WOOD DEBRIS		10/29/92					X		2	1L	Glass		X	X		X	X	X	X	Composite both containers - 1 sample
CROSS TIES		10/29/92					X		1	1L	Glass		X	X		X	X	X	X	

CHROMALAB FILE # 1092288
ORDER # 8352

Total Number of Samples Shipped: 3
Sampler's Signature: Jeff Hess

	Signature	Company	Date	Time
Relinquished by		ESI	10/29/92	6:00 pm
Received by		CHROMALAB	10/29/92	
Relinquished by				
Received by				
Relinquished by				
Received by				

Special Instructions / Shipment / Handling / Storage Requirements:

Results needed by Monday Nov. 2 for wood debris.

Please send signed copy with results to the ATTENTION OF: Jeff Hess
at the address to the right indicated by an ☒

☒ ENVIRONMENTAL SOLUTIONS, INC.
2815 Mitchell Drive, Suite 103
Walnut Creek, CA 94598
510 ~~(415)~~ 935-3294

☐ ENVIRONMENTAL SOLUTIONS, INC.
21 Technology Drive
Irvine, CA 92718
(714) 727-7300

WESTERN BIOASSAY LABORATORIES

Date: November 4, 1992

To: Mr. Jeff Hess
Environmental Solutions, Inc.
2815 Mitchell Drive, Suite 103
Walnut Creek, CA 94598

From: Linda S. Mortensen
Hazardous Waste Testing Specialist

Julianne C. Fegley
Laboratory Coordinator

Subject: Aquatic Toxicity Testing Results for Hazardous Waste Testing
Project Number: 92-797

SAMPLE MATRIX AND I.D.: One solid sample #11372 (Cross Ties) Project No. 92-797.

TREATMENT DILUTIONS (mg/L): 250, 500, 750 and Control run in soft water of 40-48 mg/L hardness and in duplicate with 10 fish/6 L tank and 20 fish/treatment.

TESTING PERIOD: Received 10/30/92; Tested 10/30/92-11/3/92.

BIOASSAY TEST(S): Fathead minnow (Pimephales promelas) 96-hour static Hazardous Waste Toxicity.

METHODS: ATT's hazardous waste aquatic toxicity test protocol based on "Standard Methods for the Examination of Water and Wastewater", 16th Edition, American Public Health Association, 1986; California's Title 22 Code, Section #66261.24; "Static Acute Bioassay Procedures for Hazardous Waste Samples" (Polisini and Miller, 1988), California Department of Fish and Game; and as certified by the State of California's Department of Toxic Substance Control (CA. EPA).

2950 Buskirk Avenue, Suite 120 • Walnut Creek, CA 94596
Laboratory: (510) 686-3215 Sales: (510) 947-4525 FAX: (510) 934-0418

SUMMARY:

Fathead minnow 96-hour percent survival was 100% in Control.

Fathead minnow 96-hour percent survival in the test concentrations was 100% for 250 mg/L, 100% for 500 mg/L and 95% for 750 mg/L.

The 96-hour LC50 >750 mg/L for sample #11372.

The transcribed data sheets and chain-of-custody for this test are enclosed.

If you have any questions concerning this report please contact Linda Mortensen, Hazardous Waste Testing Specialist, at the lab (510) 686-3215 or at the administrative office (510) 934-4884.

Western Bioassay Laboratory
2950 Buskirk Avenue
Walnut Creek, CA 94596
(415) 934-4884

STATIC ACUTE BIOASSAY
(Hazardous Waste Test)

CLIENT: Environmental Solutions, Inc. (pg. 1) ATTENTION: Mr. Jeff Hess

SAMPLE ID#: 11372 SAMPLE DESCRIPTION: Solid TESTING DATES: 10-30-92 to 11/3/92

CLIENT ID#: Cross Ties

Tech ID: (w/Fatheads)			10/30/92 INITIAL				10/31/92 24-HOUR				11/1/92 48-HOUR				11/2/92 72-HOUR				11/3/93 96-HOUR, FINAL			
TEST CONC (mg/L)	Alk * mg/L	Hard * mg/L	Live	pH	DO mg/L	Temp oC	Live	pH	DO mg/L	Temp oC	Live	pH	DO mg/L	Temp oC	Live	pH	DO mg/L	Temp oC	Live	pH	DO mg/L	Temp oC
CL-a	19	36	10	7.7	8.7	20	10	8.2	8.5	20	10	8.0	9.0	19	10	7.9	8.8	20	10	7.8	9.2	19
CL-b	19	36	10	7.7	8.6	20	10	8.1	8.5	20	10	7.9	8.9	19	10	7.9	8.9	20	10	7.8	9.1	19
250-A	N/A	N/A	10	7.7	8.6	20	10	8.0	8.3	20	10	7.8	8.9	19	10	7.9	8.8	20	10	7.5	9.0	19
250-B	N/A	N/A	10	7.7	8.8	20	10	7.9	8.5	20	10	7.8	8.8	19	10	7.8	8.8	20	10	7.5	8.9	19
500-A	N/A	N/A	10	7.7	8.5	20	10	7.9	8.5	20	10	7.8	8.7	19	10	7.9	8.9	20	10	7.5	8.8	19
500-B	N/A	N/A	10	7.7	8.8	20	10	7.9	8.3	20	10	7.8	8.7	19	10	7.8	8.8	20	10	7.5	8.8	19
750-A	21	41	10	7.7	8.6	20	10	7.9	8.3	20	10	7.9	8.7	19	10	7.9	8.6	20	10	7.5	8.6	19
750-B	21	41	10	7.6	8.8	20	10	7.8	8.3	20	10	7.8	8.7	19	10	7.7	8.8	20	9	7.4	8.7	19

96-hr. LC50: > 750 mg/L

95% Confidence Limits: Not applicable

96-hr. Final Percent Survival in Controls & Treatments: 100% in controls and test concentrations 250 mg/L and 500 mg/L; 95% in 750 mg/L.

Remarks: * Final Alkalinity, Hardness (mg/L): Controls = 22.38; 750 mg/L = 23.39.

Technician: Debra L. Mathesen

Laboratory Supervisor: Stephen E. Kusmann

CS-11372.DAT

WBL

WBL

WESTERN BIOASSAY LABORATORY
FISH BIOASSAY MEASUREMENTS

Fathead Minnow

For: Environmental Solutions, Inc.

Sample ID#: 11372 Stock Date: 10/20/92

Client ID#: Cross Ties

Average Length:	28.7	mm SL	Average Weight:	0.30	g
Standard D. (S):	2.87	mm SL	Standard D. (S):	0.09	g
Maximum Length:	32.0	mm SL	Maximum Weight:	0.45	g
Minimum Length:	24.0	mm SL	Minimum Weight:	0.16	g

	Fish Length (mm SL)	Fish Weight (g)
1.	30.0	0.28
2.	28.0	0.29
3.	29.0	0.24
4.	32.0	0.45
5.	32.0	0.36
6.	31.0	0.34
7.	30.0	0.41
8.	26.0	0.25
9.	24.0	0.20
10.	25.0	0.16

Remarks:

FISHBIO.MSM

TAT

CHAIN OF CUSTODY RECORD

Ship To: Aqua Terra Technologies
Attn:

Page 1 of 1
Project Name 92-797
Project No.
Site Location
Date 10-29-92

Sample ID	Depth	Date	Time	Sample Type: Water	Solid	Other	Comp	Grab	Sample Containers: Vol.	No.	Type	Pres.	Analysis: 96-Hour Aquatic Toxicity (per Title 22)	REMARKS
11371 Rush Wood Debris		10/29/92					X		2	1L	Glass			Composite both containers - 1 sample
Normal Cross Ties		10/29/92					X		3	8oz	Glass			Composite all 3 containers - 1 sample
11372														

Total Number of Samples Shipped: 5
Sampler's Signature: Jeff Hess

	Signature	Company	Date	Time
Relinquished by	Jeff Hess	ESI	10/29/92	16:30
Received by	Julianne Hegberg	ATI	10/29/92	16:30
Relinquished by				
Received by			10/30/92	0745 pick up
Relinquished by				
Received by				

Special Instructions / Shipment / Handling / Storage Requirements:

Results needed by Tuesday Nov. 3 for wood debris

Please send signed copy with results to the ATTENTION OF: Jeff Hess
at the address to the right indicated by an ☒

☒ ENVIRONMENTAL SOLUTIONS, INC.
2815 Mitchell Drive, Suite 103
Walnut Creek, CA 94598
510 ~~(415)~~ 935-3294

☐ ENVIRONMENTAL SOLUTIONS, INC.
21 Technology Drive
Irvine, CA 92718
(714) 727-7300

ATTACHMENT B

COPIES OF LABORATORY RESULTS FOR WOOD DEBRIS
FROM MIDDLE RIVER BRIDGE

ENVIRONMENTAL SOLUTIONS, INC.

November 3, 1992

Project No. 92-797

Mr. Jay Craft
General Supervisor Structures
Santa Fe Railway Company
740 East Carnegie Drive
San Bernardino, California 92408

NOV 4 1992

Waste Characterization
Treated Bridge Lumber
Santa Fe Railway Company
Middle River Bridge

Dear Mr. Craft:

In accordance with our telephone discussion of October 28, 1992, Environmental Solutions, Inc. has completed waste characterization activities for treated bridge lumber removed from Santa Fe's Middle River Bridge.

Activities completed included collection of samples from deck planking, piling, stringers, and caps. Samples were composited as one sample and delivered to state certified laboratories for analyses.

A copy of laboratory analyses for fish bioassay, pentachlorophenols, creosols, total metals, soluble metals, fuel hydrocarbons, petroleum hydrocarbons, and BTEX has been attached. The reported analyses support a nonhazardous waste determination for the treated lumber. Treated lumber is, however, required to be disposed at a Class II landfill.

A waste characterization package has been forwarded to FORWARD, INC., a Class II landfill in Stockton, California. A copy of the package has been enclosed.

As information, FORWARD, INC. has quoted a unit price of $29.75 per ton or $35 per cubic yard to accept the treated wood. Materials would be shipped on a nonhazardous bill of lading to be provided by FORWARD, INC.

Should a different Class II landfill site be selected, the laboratory analyses enclosed can be used to meet acceptance criteria of the alternate landfill.

Should you have any questions, please give us a call.

Very truly yours,

Tim C. Lassen
Vice President

TCL:mm

cc: M. Hardin
Frank McBee
C. Armenta
J. Hess

21 Technology Drive • Irvine, California 92718 • (714) 727-9336

ENVIRONMENTAL SOLUTIONS, INC.

November 3, 1992

Project No. 92-797

Mr. Eric D. Horton
Solid Waste Coordinator
FORWARD, INC.
Post Office Box 6336
Stockton, California 95206

Waste Characterization
Treated Bridge Lumber
Santa Fe Railway Company - Middle River Bridge

Dear Mr. Horton:

Pursuant to our various discussions, please find the attached Waste Characterization Form for Creosote treated bridge lumber removed from Santa Fe Railway Company's Middle River Bridge.

As required by your waste characterization program for disposal of treated wood, we have included laboratory analyses for fish bioassay, pentachlorophenols, creosols, metals, and hydrocarbons. The results of the analyses are reported on the waste characterization form.

A review of the analyses indicates the treated lumber is not a hazardous waste and would be acceptable for disposal at FORWARD, INC. The samples for analysis were collected on October 29, 1992, and represent a composite of deck planking, piling, stringers, and caps.

As information, we are transmitting a copy of this package under separate cover to Santa Fe. We have also advised Santa Fe that FORWARD, INC.'s disposal rate for the bridge lumber is $29.75 per ton or $35 per yard on a direct bill basis, and that the waste would be shipped on a nonhazardous waste manifest to be provided by FORWARD, Inc. A representative of Santa Fe will be in further contact with you, should your site be selected for disposal.

Should you have any questions, please give us a call.

Very truly yours,

Tim C. Lassen
Vice President

TCL:rmm
Enclosures

cc: J. Hess

FORWARD, INC.

WASTE CHARACTERIZATION FORM

RETURN TO FORWARD, INC.
ATTN: Waste Evaluation Unit
P. O. Box 6336
Stockton, California 95206

SECTION A: GENERATOR/TRANSPORTER INFORMATION

Waste Generator, Company Name: SANTA FE RAILWAY CO.
Contact Person: FRANK MCBEE/C. ARMENTA Phone: (209)441-2521
Generating Facility: Address: HWY. 4 AT ORWOOD ROAD
City: (SEE BELOW) State: CA Zip: N/A
Transporter, Company Name: TO BE DETERMINED
Contact Person: N/A Phone: N/A
Consultant, Company Name: ENVIRONMENTAL SOLUTIONS INC
Contact Person: TIM LASSEN Phone: (714) 727-9336

SECTION B: WASTE STREAM IDENTIFICATION

General Description of waste: CREOSOTE TREATED BRIDGE TIMBERS. BRIDGE ORIGINALLY CONSTRUCTED 1930.
Process generating waste: BRIDGE DEMOLITION

SECTION C: PHYSICAL CHARACTERISTICS

Color: B Physical State: ☒ Solid ☐ Liquid ☐ Slurry ☐ Paste ☐ Powder
Free Liquids: ☐ Yes ☒ No pH: - Odor: ☐ Strong ☒ Mild ☐ None

SECTION D: WASTE COMPOSITION (see SECTION E for asbestos)

(include range of concentrations for multiple samples)

Total Petroleum Hydrocarbons:

as gasoline	280	ppm
as diesel	6700	ppm
as motor oil	-	ppm
other:	-	ppm

Aromatic Hydrocarbons:

Benzene	0.330	ppm
Toluene	2.1	ppm
Xylenes (total)	8.6	ppm
Ethylbenzene	2.0	ppm

Other Components (list):

o-CRESOL	2.8 Mg/L	ppm
m-CRESOL	ND	ppm
p-CRESOL	5.6 Mg/L	ppm
		ppm
FISH BIOASSAY	96HR-LC 50 > 750 Mg/L	ppm
PENTACHLOROPHENOL	.025 Mg/L	ppm
		ppm
		ppm
		ppm
		ppm
		ppm
		ppm
		ppm
		ppm

(attach or submit additional sheets if necessary)

Metals:	Total (mg/kg)	Soluble (Cal. WET) (mg/l)	
Antimony	ND	ND	
Arsenic	0.85	ND	
Barium	ND	ND	
Beryllium	ND	ND	
Cadmium	ND	ND	
Chrom.total	ND	ND	
Chrom. VI	-	-	
Cobalt	ND	ND	
Copper	1.2	ND	
Lead	ND	ND	
Mercury	ND	ND	
Manganese	-	-	
Molybdenum	ND	ND	
Nickel	0.59	ND	
Selenium	14	0.14	
Silver	ND	ND	
Strontium	-	-	
Thallium	8.0	ND	
Vanadium	ND	ND	
Zinc	5.7	0.07	
Others(list)			

(1) C/O SANTA FE RAILWAY COMPANY-MR FRANK MCBEE (ASSISTANT SUPERINTENDANT-MAINTENANCE)
2650 TULARE STREET
FRESNO, CA. 93718

SECTION E: ASBESTOS

Indicate containment for asbestos:
☐ bags ☐ cartons ☐ drums ☐ wrapping
☐ other N/A

NOTE: All asbestos must be prepared for transportation to and disposal at the Forward Landfill in accordance with all applicable regulatory requirements.

SECTION F: SHIPPING INFORMATION

Method: ☐ bulk liquid ☒ bulk solid
☐ containerized (type):_____

Quantity: GREATER THAN 1000☒ cubic yards ☐ gallons

per ☐ month ☐ year ☐ one time only
☒ other AS REQUIRED

NOTE: All shipments must be approved by the Forward, Inc. Environmental Compliance Officer or Solid Waste Coordinator prior to delivery.

SECTION G: CERTIFICATION/INDEMNIFICATION STATEMENT

THE BELOW-NAMED COMPANY WARRANTS THAT THE ABOVE AND ANY ATTACHED OR SUBMITTED WASTE CHARACTERIZATION IS COMPLETE AND ACCURATE AND THAT BASED UPON TESTING AND ANALYSIS PERFORMED ON THE WASTE MATERIALS, NONE OF THE WASTE MATERIALS ARE HAZARDOUS AS DEFINED BY 40 CFR, PART 261, AND THE CALIFORNIA CODE OF REGULATIONS, TITLE 22. WITH THE EXCEPTION OF ASBESTOS WHICH IS PROPERLY DESCRIBED IN SECTIONS E AND F ABOVE. IN THE EVENT THAT ANY PORTION OF THE WASTE MATERIALS (OTHER THAN ASBESTOS PROPERLY DESCRIBED IN SECTIONS E AND F ABOVE) IS DETERMINED TO BE HAZARDOUS ("HAZARDOUS MATERIALS") ACCORDING TO ANY OF THE ABOVE MENTIONED REGULATIONS, EACH PARTY SHALL NOTIFY THE OTHER IN WRITING IMMEDIATELY UPON LEARNING OF SUCH DETERMINATION. THE BELOW-NAMED COMPANY SHALL WITHIN TEN (10) DAYS AFTER RECEIVING SUCH WRITTEN NOTIFICATION REGARDING A HAZARDOUS DETERMINATION, AND AT THE BELOW-NAMED COMPANY'S SOLE EXPENSE, REMOVE THE HAZARDOUS MATERIAL FROM THE FORWARD LANDFILL AND PROPERLY DISPOSE OF THEM ELSEWHERE. THE BELOW-NAMED COMPANY WARRANTS THAT ANY ASBESTOS DELIVERED TO THE FORWARD LANDFILL HAS BEEN PROPERLY DESCRIBED IN SECTIONS E AND F ABOVE AND HAS BEEN PREPARED FOR TRANSPORTATION TO AND DISPOSAL AT THE FORWARD LANDFILL IN FULL COMPLIANCE WITH APPLICABLE REGULATORY REQUIREMENTS.

THE BELOW-NAMED COMPANY SHALL DEFEND, INDEMNIFY AND SAVE HARMLESS FORWARD, INC., ITS AFFILIATES, THEIR OFFICERS, DIRECTORS, AGENTS, REPRESENTATIVES AND EMPLOYEES AND THEIR SUCCESSORS AND ASSIGNS FROM ANY LIABILITY, CLAIMS, LOSSES, DAMAGES, COSTS, LIENS, JUDGMENTS, ORDERS, GOVERNMENT DIRECTIVES, OR EXPENSES OF ANY KIND IN CONNECTION WITH THE HAZARDOUS MATERIALS AND/OR NON-CONFORMING WASTE AND IN CONNECTION WITH ANY BREACH OF THE BELOW-NAMED COMPANY'S WARRANTIES GIVEN OR THE BELOW-NAMED COMPANY'S OBLIGATIONS UNDERTAKEN HEREIN.

THE BELOW-NAMED COMPANY AGREES THAT, IN THE EVENT THAT IT LEARNS THAT THE WASTE CONSTITUENTS VARY FROM THOSE SET FORTH ABOVE OR ON ANY ATTACHED OR SUBMITTED DOCUMENTS, IT WILL IMMEDIATELY SUBMIT A CORRECTED WASTE CHARACTERIZATION FORM.

COMPANY: The A.T. & S.F. Ry. Co.

BY: (Print Name) Mick Hardin TITLE: Manager-Environmental and Hazardous Materials Control

SIGNATURE: Mick Hardin DATE: 11/2/92

CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

November 2, 1992 ChromaLab File No.: 1092288

ENVIRONMENTAL SOLUTIONS

Attn: Jeff Hess

RE: One wood sample for Gasoline and BTEX analysis

Project Name:
Project Number: 92-797
Date Sampled: October 29, 1992 Date Submitted: October 29, 1992
Date Analyzed: October 30, 1992

RESULTS:

Sample I.D.	Gasoline (mg/Kg)	Benzene (µg/Kg)	Toluene (µg/Kg)	Ethyl Benzene (µg/Kg)	Total Xylenes (µg/Kg)
WOOD DEBRIS	280	330	2100	2000	8600
BLANK	N.D.	N.D.	N.D.	N.D.	N.D.
SPIKE RECOVERY	89%	93%	91%	94%	93%
DUP SPIKE RECOVERY	----	88%	87%	89%	90%
DETECTION LIMIT	1.0	5.0	5.0	5.0	5.0
METHOD OF ANALYSIS	5030/8015	8020	8020	8020	8020

ChromaLab, Inc.

Billy Thach
Analytical Chemist

Eric Tam
Laboratory Director

do

2239 Omega Road,#1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

November 2, 1992 ChromaLab File No.: 1092288

ENVIRONMENTAL SOLUTIONS

Attn: Jeff Hess

RE: One wood sample for Diesel analysis

Project Number: 92-797
Date Sampled: October 29, 1992 Date Submitted: October 29, 1992
Date Extracted: October 30, 1992 Date Analyzed: October 30 ,1992

RESULTS:

Sample I.D.	Diesel (mg/Kg)
WOOD DEBRIS	6700*
BLANK	N.D.
SPIKE RECOVERY	106%
DUP SPIKE RECOVERY	115%
DETECTION LIMIT	1.0
METHOD OF ANALYSIS	3550/8015

* Unknown hydrocarbon in Diesel range quantified as Diesel.

ChromaLab, Inc.

Yiu Tam
Analytical Chemist

Eric Tam
Laboratory Director

do

2239 Omega Road,#1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

October 31, 1992 ChromaLab File # 1092288 A

Client: Environmental Solutions, Inc.
Attn: Kristina Carlson
Date Sampled: Oct. 29, 1992 Date Submitted: Oct. 29, 1992
Date Extracted: Oct. 31, 1992 Date Analyzed: Oct. 31, 1992

Analysis Requested: TCLP-Phenols

Project Name: 92-797
Sample I.D.: WOOD DEBRIS
Method of Analysis: TCLP 8270 Matrix: wood

COMPOUND NAME	Sample mg/L	MDL mg/L	Spike Recovery
2-METHYLPHENOL (o-CRESOL)	2.8	0.005	-----
3-METHYLPHENOL (m-CRESOL)	N.D.	0.005	98% 91%
4-METHYLPHENOL (p-CRESOL)	5.6	0.005	-----
PENTACHLOROPHENOL	0.025	0.025	115% 103%

ChromaLab, Inc.

Yiu Tam
Analytical Chemist

Eric Tam
Lab Director

2239 Omega Road, #1 • San Ramon, California 94583
510/831-1788 • Facsimile 510/831-8798
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

November 3, 1992

ChromaLab file number: 1092288

ENVIRONMENTAL SOLUTIONS

Attn: Jeff Hess

RE: One wood sample for Total CAM 17 Metals analyses (CA Title 22)

Project Name:
Project Number: 92-797
Date Sampled: October 29, 1992
Date Received: October 29, 1992
Date Analyzed: October 30, 1992

RESULTS: Sample I.D.: WOOD DEBRIS

Metals	Concentration (mg/Kg)	Detection Limit (mg/Kg)
Antimony (Sb)	N.D.	1.00
Arsenic (As)	0.85	0.25
Barium (Ba)	N.D.	0.25
Beryllium (Be)	N.D.	0.05
Cadmium (Cd)	N.D.	0.05
Cobalt (Co)	N.D.	0.50
Chromium (Cr)	N.D.	0.50
Copper (Cu)	1.2	0.25
Lead (Pb)	N.D.	0.50
Mercury (Hg)	N.D.	0.05
Molybdenum (Mo)	N.D.	0.25
Nickel (Ni)	0.59	0.50
Selenium (Se)	14	0.50
Silver (Ag)	N.D.	0.25
Thallium (Tl)	8.0	2.00
Vanadium (V)	N.D.	0.50
Zinc (Zn)	5.7	0.25

Method of Analysis: 3050/6010/7471

ChromaLab, Inc.

Charles Woolley
Analytical Chemist

Eric Tam
Laboratory Director

cc

2239 Omega Road,#1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

November 3, 1992

ChromaLab File No.: 1092288

ENVIRONMENTAL SOLUTIONS

Attn: Jeff Hess

RE: One wood sample for Waste Extraction (STLC) CAM 17 analyses

Project Name:
Project Number: 92-797
Date Sampled: October 29, 1992
Date Submitted: October 29, 1992
Date Analyzed: November 2, 1992

RESULTS: Sample I.D.: WOOD DEBRIS

Metals	Concentration (mg/L)	Detection Limit (mg/L)
Antimony (Sb)	N.D.	0.20
Arsenic (As)	N.D.	0.05
Barium (Ba)	N.D.	0.05
Beryllium (Be)	N.D.	0.01
Cadmium (Cd)	N.D.	0.01
Cobalt (Co)	N.D.	0.10
Chromium (Cr)	N.D.	0.10
Copper (Cu)	N.D.	0.05
Lead (Pb)	N.D.	0.10
Mercury (Hg)	N.D.	0.01
Molybdenum (Mo)	N.D.	0.05
Nickel (Ni)	N.D.	0.20
Selenium (Se)	0.14	0.10
Silver (Ag)	N.D.	0.05
Thallium (Tl)	N.D.	0.10
Vanadium (V)	N.D.	0.10
Zinc (Zn)	0.07	0.05

Method of Analysis: WET/3010/6010/7470

ChromaLab, Inc.

Charles Woolley
Analytical Chemist

Eric Tam
Laboratory Director

cc

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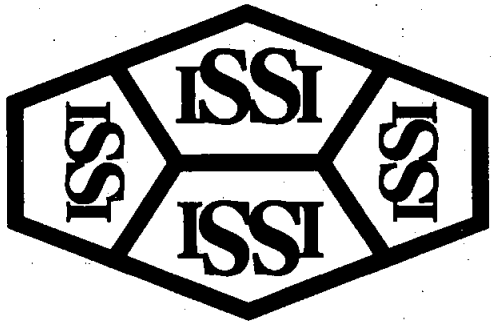
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157



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ISSI Operations Staff

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TAT

CHAIN OF CUSTODY RECORD

Ship To: CHROMALAB
Attn:

Page 1 of 1
Project Name 92-797
Project No.
Site Location
Date 10-29-92

Sample ID	Depth	Date	Time	Sample Type: Water	Solid	Other	Comp	Grab	Sample Containers: Vol.	No.	Type	Pres.	CAM 17 metals	STLC metals	TPH-G/BTEX	TPH-D	TCLP for PCP	o,m,p-Cresol	REMARKS
WOOD DEBRIS		10/29/92					X		2	1L	Glass		X	X		X	X	X	X	Composite both containers - 1 sample
CROSS TIES		10/29/92					X		1	1L	Glass		X	X		X	X	X	X	

Rush
Normal

Analysis

CHROMALAB FILE # 1092288
ORDER # 8352

Total Number of Samples Shipped: 3
Sampler's Signature: Jeff Hess

	Signature	Company	Date	Time
Relinquished by		ESI	10/29/92	6:00 pm
Received by		CHROMALAB	10/29/92	
Relinquished by				
Received by				
Relinquished by				
Received by				

Special Instructions / Shipment / Handling / Storage Requirements:

Results needed by Monday Nov. 2 for wood debris.

Please send signed copy with results to the ATTENTION OF: Jeff Hess
at the address to the right indicated by an ☒

☑ ENVIRONMENTAL SOLUTIONS, INC.
2815 Mitchell Drive, Suite 103
Walnut Creek, CA 94598
510 ~~(415)~~ 935-3294

☐ ENVIRONMENTAL SOLUTIONS, INC.
21 Technology Drive
Irvine, CA 92718
(714) 727-7300

WESTERN BIOASSAY LABORATORIES

Date: November 4, 1992

To: Mr. Jeff Hess
Environmental Solutions, Inc.
2815 Mitchell Drive, Suite 103
Walnut Creek, CA 94598

From: LSM Linda S. Mortensen
Hazardous Waste Testing Specialist

JCF Julianne C. Fegley
Laboratory Coordinator

Subject: Aquatic Toxicity Testing Results for Hazardous Waste Testing
Project Number: 92-797

SAMPLE MATRIX AND I.D.: One solid sample #11371 (Wood Debris) Project No. 92-797.

TREATMENT DILUTIONS (mg/L): 250, 500, 750 and Control run in soft water of 40-48 mg/L hardness and in duplicate with 10 fish/6 L tank and 20 fish/treatment.

TESTING PERIOD: Received 10/30/92; Tested 10/30/92-11/3/92.

BIOASSAY TEST(S): Fathead minnow (Pimephales promelas) 96-hour static Hazardous Waste Toxicity.

METHODS: ATT's hazardous waste aquatic toxicity test protocol based on "Standard Methods for the Examination of Water and Wastewater", 16th Edition, American Public Health Association, 1986; California's Title 22 Code, Section #66261.24; "Static Acute Bioassay Procedures for Hazardous Waste Samples" (Polisini and Miller, 1988), California Department of Fish and Game; and as certified by the State of California's Department of Toxic Substance Control (CA. EPA).

2950 Buskirk Avenue, Suite 120 • Walnut Creek, CA 94596
Laboratory: (510) 686-3215 Sales: (510) 947-4525 FAX: (510) 934-0418

SUMMARY:

Fathead minnow 96-hour percent survival was 100% in Control.

Fathead minnow 96-hour percent survival in the test concentrations was 100% for 250 mg/L, 95% for 500 mg/L and 100% for 750 mg/L.

The 96-hour LC50 >750 mg/L for sample #11371.

The transcribed data sheets and chain-of-custody for this test are enclosed.

If you have any questions concerning this report please contact Linda Mortensen, Hazardous Waste Testing Specialist, at the lab (510) 686-3215 or at the administrative office (510) 934-4884.

Western Bioassay Laboratory
2950 Buskirk Avenue
Walnut Creek, CA 94596
(415) 934-4884

STATIC ACUTE BIOASSAY
(Hazardous Waste Test)

CLIENT: Environmental Solutions, Inc. (pg. 1) ATTENTION: Mr. Hess

SAMPLE ID#: 11371 SAMPLE DESCRIPTION: Solid TESTING DATES: 10/30/92 to 11/3/92

CLIENT ID#: Wood Debris

Tech ID: (W/Fatheads)			10/30/92 INITIAL				10/31/92 24-HOUR				11/1/92 48-HOUR				11/2/92 72-HOUR				11/3/93 96-HOUR, FINAL			
TEST CONC (mg/L)	Alk * mg/L	Hard * mg/L	Live	pH	DO mg/L	Temp oC	Live	pH	DO mg/L	Temp oC	Live	pH	DO mg/L	Temp oC	Live	pH	DO mg/L	Temp oC	Live	pH	DO mg/L	Temp oC
CL-a	19	36	10	7.7	8.6	20	10	8.2	8.5	20	10	8.0	9.0	19	10	7.9	8.8	20	10	7.8	9.2	19
CL-b	19	36	10	7.7	8.6	20	10	8.1	8.5	20	10	7.9	8.9	19	10	7.9	8.9	20	10	7.8	9.1	19
250-A	N/A	N/A	10	7.6	8.5	20	10	8.1	8.5	20	10	7.9	8.8	19	10	7.9	8.8	20	10	7.8	9.0	19
250-B	N/A	N/A	10	7.7	8.6	20	10	8.1	8.5	20	10	7.9	8.8	19	10	8.0	8.8	20	10	7.7	9.0	19
500-A	N/A	N/A	10	7.7	8.6	20	10	8.1	8.5	20	10	7.8	8.8	19	10	7.9	8.7	20	9	7.6	9.0	19
500-B	N/A	N/A	10	7.7	8.7	20	10	8.0	8.3	20	10	7.7	8.8	19	10	7.9	8.8	20	10	7.4	9.0	19
750-A	19	36	10	7.7	8.5	20	10	8.0	8.1	20	10	7.8	8.6	19	10	7.9	8.7	20	10	7.6	8.6	19
750-B	19	36	10	7.7	8.8	20	10	8.0	8.3	20	10	7.8	8.7	19	10	7.9	8.8	20	10	7.6	8.8	19

96-hr. LC50: > 750 mg/L

95% Confidence Limits: Not Applicable

96-hr. Final Percent Survival in Controls & Treatments: 100% in controls and test concentrations 250 mg/L and 750 mg/L; 95% in 500 mg/L

Remarks: * Final Alkalinity, Hardness (mg/L): Controls = 22.38; 750 mg/L = 22.39

Technician: Linda J. Mortensen

Laboratory Supervisor: Stephen Ehmann

ES-11371.DAT

WBL

WBI

WESTERN BIOASSAY LABORATORY
FISH BIOASSAY MEASUREMENTS

Fathead Minnow

For: Environmental Solutions, Inc.

Sample ID#: 11371 Stock Date: 10/20/92

Client ID#: Wood Debris

Average Length:	28.7	mm SL	Average Weight:	0.30	g
Standard D. (S):	2.87	mm SL	Standard D. (S):	0.09	g
Maximum Length:	32.0	mm SL	Maximum Weight:	0.45	g
Minimum Length:	24.0	mm SL	Minimum Weight:	0.16	g

	Fish Length (mm SL)	Fish Weight (g)
1.	30.0	0.28
2.	28.0	0.29
3.	29.0	0.24
4.	32.0	0.45
5.	32.0	0.36
6.	31.0	0.34
7.	30.0	0.41
8.	26.0	0.25
9.	24.0	0.20
10.	25.0	0.16

Remarks:

FISHBIO.MSM

TAT

CHAIN OF CUSTODY RECORD

Ship To: Aqua Terra Technologies
Attn:

Page 1 of 1
Project Name 92-797
Project No.
Site Location
Date 10-29-92

Sample ID	Depth	Date	Time	Sample Type: Water	Sample Type: Solid	Sample Type: Other	Comp.	Grab	Sample Containers: Vol.	Sample Containers: No.	Sample Containers: Type	Sample Containers: Pres.	Analysis: 96-Hour Aquatic Toxicity (per T-HZ 22)	REMARKS
11371 Rush Wood Debris		10/29/92					X		2	1L	Glass			Composite both containers - 1 sample
Normal Cross Ties		10/29/92					X		3	Box	Glass			Composite all 3 containers - 1 sample
11372														

Total Number of Samples Shipped: 5
Sampler's Signature: Jeff Hess

	Signature	Company	Date	Time
Relinquished by	Jeff Hess	ESI	10/29/92	16:30
Received by	Julianne Hegberg	ATI	10/29/92	16:30
Relinquished by				
Received by			10/30/92	0745 pick up
Relinquished by				
Received by				

Special Instructions / Shipment / Handling / Storage Requirements:

Results needed by Tuesday Nov. 3 for wood debris

Please send signed copy with results to the ATTENTION OF: Jeff Hess
at the address to the right indicated by an ☒

☑ ENVIRONMENTAL SOLUTIONS, INC.
2815 Mitchell Drive, Suite 103
Walnut Creek, CA 94598
510 ~~(415)~~ 935-3294

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21 Technology Drive
Irvine, CA 92718
(714) 727-7300

01/25/93

Coal Tar Creosote Treated Wood — WPR00008OC9211
60/40 Creosote-Coal Tar Solution (Pressure Applications) — IND00105JU9206

Your company is a current purchaser or has received/requested samples of one or more of the above-named products. Material Safety Data Sheets are enclosed for these products. Material Safety Data Sheets are being supplied to you as required by the OSHA Hazard Communication Standard (29 CFR 1910.1200) and/or Canada's Workplace Hazardous Material Information System (WHMIS) to assist you in the development of your Hazard Communication Program.

Treated Wood Products: The federal OSHA Hazard Communication Standard exempts wood and wood products, but not wood dust, from its requirements. For our customer's convenience, Koppers has prepared MSDSs for treated wood products reflecting the potential hazards of wood dust generated from the treated wood product.

It is your responsibility to provide this information to the appropriate individual(s) within your organization who are responsible for the dissemination of this information to your employees. If this product/sample is used at a location other than that of the mailing address, it is your responsibility to forward this information to the location(s) at which this product is used. If this Material Safety Data Sheet is revised, the revised version will be forwarded to you. If you resell a Koppers product, it is your responsibility to provide adequate warnings to your customers in the form of the Material Safety Data Sheet and labels.

If you are a wholesale/retail distributor who sells Koppers products to commercial customers, you must provide an MSDS to these customers upon request. Additionally, you must post a sign or otherwise inform your customers that an MSDS is available to them upon request.

If you need information concerning Material Safety Data Sheets, their distribution or product labeling, contact John E. Marcinowski at 412 227-2884 If you need technical information concerning the products you purchase from us, call 412 227-2001. If you need access to Koppers Medical Emergency Response System call toll-free, 1 800 553-5631. For emergency calls originating outside the U.S.A., call 412 227-2001.

Koppers is pleased to provide you with this information and looks forward to serving you again in the future.

MATERIAL SAFETY DATA SHEET

K O P P E R S

MEDICAL EMERGENCIES: 1 800 553-5631
OUTSIDE U.S.A.: 412 227-2001
GENERAL INFORMATION: 412 227-2884

KOPPERS INDUSTRIES, INC.
436 SEVENTH AVENUE
PITTSBURGH, PA. 15219-1800

CHEMTREC ASSISTANCE 1 800 424-9300
CANUTEC: 1 613 996-6666

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: Coal Tar Creosote Treated Wood

COMMODITY NUMBER: 00000011

SYNONYM: None

PRODUCT USE: Treated Wood

CHEMICAL FAMILY: NA

FORMULA: Preserved wood

CAS NUMBER: None

DOT PROPER SHIPPING NAME: None

DOT HAZARD CLASS: None

UN/NA NUMBER: None

CANADIAN PRODUCT CLASSIFICATION: Wood product - exempted

SECTION II - HEALTH/SAFETY ALERT

CAUTION
HANDLING MAY CAUSE SPLINTERS
PRESERVATIVE TREATMENT MAY CAUSE EYE AND SKIN IRRITATION
OBSERVE GOOD HYGIENE AND SAFETY PRACTICES WHEN HANDLING THIS PRODUCT
DO NOT USE THIS PRODUCT UNTIL MSDS HAS BEEN READ AND UNDERSTOOD
WARNING: THIS PRODUCT CONTAINS A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.
DO NOT BURN IN OPEN FIRES, STOVES, FIREPLACE OR RESIDENTIAL BOILERS.

SECTION III - HEALTH HAZARD INFORMATION

EYE: Treated or untreated wood dust or preservative may cause irritation.

SKIN: Transfer of preservative to skin can result in irritation which when accentuated by sunlight may result in a phototoxic skin reaction. See Section XII - Comments.

INHALATION: FInely divided wood dust, treated or untreated, may cause nose, throat or lung irritation and other respiratory effects. Preservative vapor may cause respiratory tract irritation. If exposed in a closed space, vapors may produce headache, drowsiness, and possible weakness and incoordination. See Section XII - COMMENTS.

INGESTION: Eating treated sawdust may cause mouth, throat and stomach irritation. Nausea, vomiting and diarrhea can occur.

SECTION IV - EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT: Gently flush any particles from the eye with large amounts of water for 15 minutes. DO NOT RUB EYES.

SKIN CONTACT: Rinse skin free of material with water to avoid abrasion of skin. DO NOT RUB until skin is free of material then wash thoroughly with soap and water.

INHALATION: Remove from exposure. If breathing has stopped or is difficult, administer artificial respiration or oxygen as indicated. Seek medical aid.

INGESTION: Wipe material from mouth and lips. If symptoms appear, seek medical aid.

NOTE TO PHYSICIAN: There is no specific antidote for effects from overexposure to this material. Treatment should be directed at the control of symptoms and the clinical conditions.

SECTION V - FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT & METHOD NA AUTOIGNITION TEMP: NA

FLAMMABLE LIMITS (% BY VOLUME/AIR): LOWER: NA UPPER: NA

TDG FLAMMABILITY CLASSIFICATION: None

EXTINGUISHING MEDIA: Use water stream/spray/fog. Use methods applicable to surrounding area.

FIRE-FIGHTING PROCEDURES: Wear complete fire service protective equipment, including full-face MSHA/NIOSH approved self-contained breathing apparatus. Use water to cool fire-exposed container/structure/protect personnel.

FIRE AND EXPLOSION HAZARDS: Dust may form explosive mixture with air. When heated (fire conditions), vapors/decomposition products may be released forming flammable/explosive mixtures in air. Under fire conditions, may emit irritant/toxic gas and/or fumes.

SENSITIVITY TO MECHANICAL IMPACT: ND

SENSITIVITY TO STATIC DISCHARGE: ND

SECTION VI - SPILL, LEAK AND DISPOSAL INFORMATION

SPILL OR LEAK PROCEDURES (PRODUCT): Not applicable

WASTE DISPOSAL: Dispose of treated wood by ordinary trash collection or burial. Treated wood should not be burned in open fires or in stoves, fireplaces or residential boilers because toxic chemicals may be produced as part of the smoke and ashes. Treated wood from commercial or industrial use (e.g.,

construction sites) may be burned only in commercial or industrial incinerators or boilers in accordance with state and federal regulations.

SECTION VII - RECOMMENDED EXPOSURE LIMIT/HAZARDOUS INGREDIENTS

EXPOSURE LIMIT (PRODUCT): None established; See Ingredients. The ACGIH-TWA for respirable wood dust is 5.0 mg/m3 (stel 10.0 mg/m3) for softwoods and 1.0 mg/m3 for hardwoods.

*for coal tar pitch volatiles, OSHA-PEL and the ACGIH-TWA is 0.2 mg/m3 (8Hr TWA), benzene soluble fraction.

**based on treatment at a level of 7 lbs/ft2 and wood density of 40 lbs/ft3 - actual percentage may vary due to differences in woodstock and treatment

Less than 0.1 % coal tar is added to this product

HAZARDOUS INGREDIENTS	CAS NUMBER	%BY WT.	EXPOSURE LIMIT (PPM;MG/M3)		
Creosote	8001-58-9	<15**	*		
Wood dust (certain hardwood such as beech & oak)-			ACGIH-TWA	-	1
			proposed:		
			OSHA-PEL	-	1
			OSHA-TWA	-	5
			OSHA-STEL	-	10
(soft wood)			proposed:		
			OSHA-PEL	-	5
			OSHA-STEL	-	10
			ACGIH-TWA	-	5
			ACGIH-STEL	-	10
			OSHA-TWA	-	5
			OSHA-STEL	-	10

SECTION VIII - PERSONAL PROTECTION INFORMATION

EYE PROTECTION: Industrial safety glasses, minimum. As necessary to comply with 29 CFR 1910.133 and work area conditions: use side shields, goggles or face shield. When power-sawing and machining, wear goggles.

SKIN PROTECTION: Industrial type resistant (eg. vinyl coated) heavy duty-type flexible gloves required for prolonged or frequent contact. For dusty operations (areas) wear necessary resistant protective apparel to include required head, hand and safety-type footwear. Wear tightly woven coveralls or long sleeved shirts and long pants.

RESPIRATORY PROTECTION: Not normally required except when handling procedure(s) generate dust.If ventilation does not maintain inhalation exposures below PEL(TLV), use MSHA/NIOSH approved units as per current 29 CFR 1910.134, If within OSHA protection factor, air purifying OV/filter units OK.

VENTILATION: Ventilation necessary only if material handling generates dust. Provide sufficient general/local exhaust ventilation in pattern/volume to control inhalation (molten) exposures below current exposure and areas below explosive dust concentrations.

SECTION IX - PERSONAL HANDLING INSTRUCTIONS

HANDLING: Avoid frequent or prolonged contact with the skin or inhalation of treated wood dusts. Avoid prolonged or repeated contact with skin or eyes. Do not wear contaminated clothing. Launder separately from household clothing before reuse, or discard. When sawing and machining treated wood, wear a dust mask.

STORAGE: No special storage is required.

OTHER: If oily preservatives/sawdust soil clothes, launder before reuse. Urethane/epoxy/shellac are acceptable sealers for creosote treated wood. Whenever possible, sawing/machining treated wood should be performed outdoors to avoid accumulations of airborne treated wood sawdust. Coal tar pitch and coal tar pitch emulsions are effective sealers for creosote treated wood block flooring.

SECTION X - REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY: Stable under normal conditions,

INCOMPATABILITY: Strong acids, open flame.

HAZARDOUS REACTIONS/DECOMPOSITION/COMBUSTION PRODUCTS: Combustion products include carbon monoxide, oxides of nitrogen.

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION: None

SECTION XI - PHYSICAL DATA

BOILING POINT: NA	SPECIFIC GRAVITY: > Untreated wood
MELTING POINT: NA	% VOLATILE BY VOL: NA
VAPOR PRESSURE: NA	EVAPORATION RATE(ETHER=1): NA
VAPOR DENSITY(AIR=1):NA	VISCOSITY: NA
SOLUBILITY (WATER): NA	pH: NA

VOC: NA

COEFFICIENT OF WATER/OIL DISTRIBUTION: ND

APPEARANCE/ODOR: Treatment imparts a dark brown-to-black color with tarry odor.

SECTION XII - COMMENTS

Persons with pre-existing disease in or a history of ailments involving the skin or respiratory tract may be at a greater than normal risk of developing adverse health effects from woodworking operations with this product.

UNTREATED WOOD DUST OR SAWDUST: The principal health effects reported from occupational exposure to sawdust or wood dust generated from untreated

wood are dermatitis, rhinitis, conjunctivitis, reduced or suppressed mucociliary clearance rates, chronic obstructive lung changes, and nasal sinus cancer. Skin and respiratory sensitization have been reported from exposure to hardwood dust.

Epidemiological studies have been reported on carcinogenic risks of employment in the furniture-making industry, the carpentry industry, and the lumber and sawmill industry. IARC has reviewed these studies and reports that there is sufficient evidence that nasal carcinomas have been caused by employment in the furniture-making industry where the excess risk is associated with exposure to untreated wood dust or sawdust from hardwood species. IARC concluded that epidemiological data are not sufficient to make a definite assessment of the carcinogenic risks of employment as a carpenter or worker in a lumbermill or sawmill.

CREOSOTE PRESERVATIVE: The IARC monographs (Vol 35) state that there is sufficient evidence for the carcinogenicity of creosote in experimental animals. The NTP Annual Report on Carcinogens states that creosote oils are carcinogenic in experimental animals. Creosote does not appear in the OSHA Subpart Z Table.

Epidemiological studies of workers in the woodtreating industry have shown no significant health effects due to occupational exposure to creosote. The application of a commerically available sun-blocking lotion is recommended to greatly reduce the phototoxicity of coal tar associated sun burning. The lotion should be applied prior to the application of the barrier cream and should have a sun protection factor (SPF) greater than 15. Application of barrier creams, i.e., Ply 9 Gel, Fend A-2 Cream, Kerodex 51 to prevent coal tar containing products from contacting skin before working/several times during work may be beneficial.

Showering and clothing change recommended at the end of each shift.

No known ingredients which occur at greater than 0.1%, other than those listed above, are listed as a carcinogen in the IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans, the NTP Annual Report on Carcinogens or OSHA 29 CFR 1910.1001-1047 subpart Z Toxic and Hazardous Substances (Specifically Regulated Substances).

SKIN PROTECTION (protective material): Permeation/degradation values of chemical mixtures cannot be predicted from pure components or chemical classes. Thus, these materials are normally best estimates based on available pure component data. A significant difference in chemical breakthrough time has been reported for generically similar gloves from different manufacturers (AIHA J., 48, 941-947 1987).

Do not use until Consumer Information Sheet is read and understood. Wash exposed areas promptly and thoroughly after skin contact from working with this product and before eating, drinking, using tobacco products or rest rooms.

Do not wear contact lens without proper eye protection when using this product.

Prepared By: Occupational Health and Product Safety Department

---

REVISION DATE: 10/92 CODE NUMBER: WPR000080C9211
SPECIFICATION SHEET NUMBER: REPLACES SHEET: WPR00008JU9110
COMMODITY NUMBER: 00000011

SUPPLIER INFORMATION: Same as manufacturer.

NOTICE: While the information and recommendations set forth herein are believed to be accurate as of the date hereof, Koppers Industries makes no warranty with respect thereto and disclaims all liability from reliance thereon.

RAILROAD SIGNAL AND TELEPHONE POLE WARNINGS

The railroad signal and telephone poles sold or acquired by donation under this agreement have been treated with either creosote, pentachlorophenol, inorganic arsenic, or a combination of two or more of them. Attached to this agreement are the Material Safety Data Sheets (MSDS's) on these chemical and information sheets setting forth certain precautions to be exercised by anyone using or handling treated poles.

Purchaser/donee acknowledges that it has read all MSDS's and all six (6) sheets of the information sheets and that it will provide copies of these documents to each employee handling or using the poles, anyone to whom it resells or gives the poles, or anyone else it authorizes to use the poles in any manner.

Purchaser/donee further agrees to indemnify and hold Norfolk Southern Corporation and any of its railroad subsidiaries harmless from and against any and all claims, demands, liabilities, penalties and all costs associated therewith (including reasonable attorneys' fees) arising out of the use or handling of the poles by any of the individuals mentioned above or arising out of purchaser/donee's failure to provide such individuals with the MSDS's and information sheets.

PLEASE SIGN AND RETURN TO:
(This sheet only)

NORFOLK SOUTHERN CORPORATION
Attention: R.L. Miller
P.O. Box 349
24424 N. Prairie Road
Bellevue, Ohio 44811

_____
Name of Principal Purchaser/Donee

By: _____
Print or Type Name

Title: _____

Date: _____

PENTACHLOROPHENOL
PRESSURE TREATED WOOD

Consumer Information:

This wood has been preserved by pressure treatment with an EPA registered pesticide containing pentachlorophenol to protect it from insect attach and decay. Wood treated with pentachlorophenol should be used only where such protection is important.

Pentachlorophenol penetrates deeply into and remains in the pressure-treated wood for a long time. Exposure to pentachlorophenol may present certain hazards. Therefore, the following precautions should be taken both when handling the treated wood and in determining where to use and dispose of the treated wood.

Use Site Precautions:

Logs treated with pentachlorophenol should not be used for log homes.

Wood treated with pentachlorophenol should not be used where it will be in frequent or prolonged contact with bare skin (for example: chairs and other outdoor furniture), unless an effective sealer has been applied.

Pentachlorophenol-treated wood should not be used in residential, industrial, or commercial interiors except for laminated beams or building components which are in ground contact and are subject to decay or insect infestation and where two coats of an appropriate sealer are applied. Sealers may be applied at the installation site.

Wood treated with pentachlorophenol should not be used in the interiors of farm buildings where they may be direct contact with domestic animals or livestock which may crib (bite) or lick the wood.

In interiors of farm buildings where domestic animals or livestock are unlikely to crib (bite) or lick the wood, pentachlorophenol-treated woods may be used for building components which are in ground contact and are subject to decay or insect infestation and where two coats of an appropriate sealer are applied. Sealers may be applied at the installation site.

Do not use pentachlorophenol-treated wood for farrowing or brooding facilities.

Do not use treated wood under circumstances where the preservative may become a component of food or animal feed. Examples of such sites would be structures or containers for storing silage or food.

Do not use treated wood for cutting-boards or countertops.

Only treated wood that is visibly clean and free of surface residue should be used for patios, decks and walkways.

Do not use treated wood for construction of those portions of beehives which may come into contact with the honey.

Pentachlorophenol-treated wood should not be used where it may come into direct or indirect contact with public drinking water except for uses involving incidental contact such as docks and bridges.

Do not use pentachlorophenol-treated wood where it may come into direct or indirect contact with drinking water for domestic animals or livestock, except for used involving incidental contact such as bridges and docks.

Handling Precautions:

Dispose of treated wood by ordinary trash collection or burial. Treated wood should not be burned in open fires or in stoves, fireplaces, or residential boilers because toxic chemicals may be produced as part of the smoke and ashes. Treated wood from commercial or industrial use (e.g., construction sites) may be burned only in commercial or industrial incinerators or boilers rated at 20 million BTU/hour or greater heat input or its equivalent in accordance with state and federal regulations.

Avoid frequent or prolonged inhalation of sawdust from treated wood. When sawing and machining treated wood, wear a dust mask. Whenever possible, these operations should be performed outdoors to avoid indoor accumulations of airborne sawdust from treated wood.

Avoid frequent or prolonged skin contact with pentachlorophenol-treated wood; when handling the treated wood, wear long-sleeved shirts and long pants and use gloves impervious to the chemicals (for example: gloves that are vinyl-coated).

When power-sawing and machining, wear goggles to protect eyes from flying particles.

After working with the wood, and before eating, drinking, and use of tobacco products, wash exposed areas thoroughly.

If oily preservatives or sawdust accumulate on clothes, launder before reuse. Wash work clothes separately from other household clothing.

Urethane, shellac, latex epoxy enamel and varnish are acceptable sealers for pentachlorophenol-treated wood.

SP1398f/RWR

INORGANIC ARSENICAL
PRESSURED TREATED WOOD

Consumer Information:

This wood has been preserved by pressured-treatment with an EPA-registered pesticide containing inorganic arsenic to protect it from insect attack and decay. Wood treated with inorganic arsenic should be used only where such protection is important.

Inorganic arsenic penetrates deeply into and remains in the pressure-treated wood for a long time. Exposure to inorganic arsenic may present certain hazards. Therefore, the following precautions should be taken both when handling the treated wood and in determining where to use or dispose of the treated wood.

Use Site Precautions:

Wood pressure-treated with waterborne arsenical preservatives may be inside residences as long as all sawdust and construction debris are cleaned-up and disposed of after construction.

Do not use treated wood under circumstances where the preservative may become a component of food or animal feed. Examples of such sites would be structures or containers for storing silage or food.

Do not use treated wood for cutting-boards or countertops.

Only treated wood that is visibly clean and free of surface reside should be used for patios, decks and walkways.

Do not use treated wood for construction of those portions of beehives which may come into contact with the honey.

Treated wood should not be use where it may come into direct or indirect contact with public drinking water, except for uses involving incidental contact such as docks and bridges.

Handling Precautions:

Dispose of treated wood by ordinary trash or burial. Treated wood should not be burned in open fires or in stoves, fireplaces, or residential boilers because toxic chemicals may be produced as part of the smoke and ashes. Treated wood from commercial or industrial use (e.g., construction sites) may be burned only in commercial or industrial incinerators or boilers in accordance with state and federal regulations.

Avoid frequent or prolonged inhalation of sawdust from treated wood. When sawing and machining treated wood, wear a dust mask. Whenever possible, these operations should be performed outdoors to avoid indoor accumulations of airborne sawdust from treated wood.

When power-sawing and machining, wear goggles to protect eyes from

flying particles.

After working with the wood, and before eating, drinking, and use of tobacco products, wash exposed areas thoroughly.

If preservatives or sawdust accumulate on clothes, launder before reuse. Wash work clothes separately from other household clothing.

SP1400/RWR

CREOSOTE
PRESSURED-TREATED WOOD

CONSUMER INFORMATION:

This wood has been preserved by pressure treatment with an EPA-registered pesticide containing creosote to protect it from insect attack and decay. Wood treated with creosote should be used only where such protection is important.

USE SITE PRECAUTIONS:

Wood treated with creosote should not be used where it will be frequent or prolonged contact with bare skin (for example: chairs and other outdoor furniture) unless an effective sealer has been applied.

Creosote-treated wood should not be used in residential interiors. Creosote-treated wood in interiors of industrial buildings should be used only for industrial building components which are in ground contact and are subject to decay or insect infestation and wood block flooring. For such uses, two coats of an appropriate sealer must be applied. Sealers may be applied at the installation site.

Wood treated with creosote should not be used in the interiors of farm buildings where there may be direct contact with domestic animals or livestock which may crib (bite) or lick the wood.

Interiors of farm buildings where domestic animals or livestock are unlikely to crib (bite) or lick the wood, creosote-treated wood may be used for building components which are in ground contact and are subject to decay or insect infestation if two coats of an effective sealer are applied. Sealers may be applied at the installation site.

Do not use creosote-treated wood for farrowing or brooding facilities.

Do not use treated wood under circumstances where the preservative may become a component of food or animal feed. Examples of such use would be structures or containers for storing silage or food.

Do not use treated wood for cutting boards or countertops.

Only treated wood that is visibly clean and free of surface residues should be used for patios, decks and walkways.

Do not use treated wood for construction of those portions of beehives which may come into contact with the honey.

Creosote-treated wood should not be used where it may come into direct or indirect contact with public drinking water, except for uses involving incidental contact such as docks and bridges.

Do not used creosote-treated wood where it may come into direct or indirect contact with drinking water for domestic animals or livestock, except for uses involving incidental contact such as docks and bridges.

HANDLING PRECAUTIONS:

Dispose of treated wood by ordinary trash collection or burial. Treated wood should not be burned in open fires or in stoves, fireplaces, or residential boilers because toxic chemicals may be produced as part of the smoke and ashes. Treated wood from commercial or industrial use (e.g., construction sites) may be burned only in commercial or industrial incinerators or boilers in accordance with state and federal regulations.

Avoid frequent or prolonged inhalation of sawdust from treated wood. When sawing and machining treated wood, wear of dust mask. Whenever possible, these operations should be performed outdoors to avoid indoor accumulations of airborne sawdust from treated wood.

Avoid frequent or prolonged skin contact with creosote-treated wood; when handling the treated wood; wear long-sleeved shirts and long pants and use gloves impervious to the chemicals (for example: gloves that are vinyl-coated).

When power-sawing and machining, wear goggles to protect eyes from flying particles.

After working with the wood, and before eating, drinking, and use of tobacco products, wash exposed areas thoroughly.

If oily preservatives or sawdust accumulate on clothes, launder before reuse. Wash work clothes separately from other household clothing.

Coal tar pitch and coal tar pitch emulsion are effective sealers for creosote-treated wood-block flooring. Urethane, epoxy, and shellac are acceptable sealers for all creosote-treated wood.

SP1399f/RWR

RAILROAD SIGNAL AND TELEPHONE POLE WARNINGS

The railroad signal and telephone poles sold or acquired by donation under this agreement have been treated with either creosote, pentachlorophinol, inorganic arsenic, or a combination of two or more of them. Attached to this agreement are the Material Safety Data Sheets (MSDSs) on these chemicals and information sheets setting forth certain precautions to be exercised by anyone using or handling the treated poles. Purchaser/donee acknowledges that it has read all MSDSs and all six (6) sheets of the information sheets and that it will provide copies of these documents to each employee handling or using the poles, anyone to whom it resells or gives the poles, or anyone else it authorizes to use the poles in any manner. Purchaser/donee further agrees to indemnify and hold Norfolk Southern Corporation and any of its railroad subsidiaries harmless from and against any and all claims, demands, liabilities, penalties and all costs associated therewith (including reasonable attorneys' fees) arising out of the use of handling of the poles by any of the individuals mentioned above or arising out of purchaser/donee's failure to provide such individuals with the MSDSs and information sheets.

PLEASE SIGN AND RETURN TO:
(This sheet only)

NORFOLK SOUTHERN CORPORATION
Attention: R. L. Miller
24424 N. Prairie Road
Bellevue, Ohio 44811

_____
Name of Principal Purchaser/Donee

By: _____
Print or Type Name

Title: _____

Date: _____

RAILROAD SIGNAL AND TELEPHONE POLE WARNINGS

The railroad signal and telephone poles sold or acquired by donation under this agreement have been treated with either creosote, pentachlorophinol, inorganic arsenic, or a combination of two or more of them. Attached to this agreement are the Material Safety Data Sheets (MSDS's) on these chemical and information sheets setting forth certain precautions to be exercised by anyone using or handling treated poles.

Purchaser/donee acknowledges that it has read all MSDS's and all six (6) sheets of the information sheets and that it will provide copies of these documents to each employee handling or using the poles, anyone to whom it resells or gives the poles, or anyone else it authorizes to use the poles in any manner.

Purschaser/donee further agrees to indemnify and hold Norfolk Southern Corporation and any of its railroad subsidiaries harmless from and against any and all claims, demands, liabilities, penalties and all costs associated therewith (including reasonable attorneys' fees) arising out of the use or handling of the poles by any of the individuals mentioned above or arising out of purchaser/donee's failure to provide such individuals with the MSDS's and information sheets.

PLEASE SIGN AND RETURN TO:
(This sheet only)

NORFOLK SOUTHERN CORPORATION
Attention: R.L. Miller
P.O. Box 349
24424 N. Prairie Road
Bellevue, Ohio 44811

_____
Name of Principal Purchaser/Donee

By: _____
Print or Type Name

Title: _____

Date: _____